

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Household and similar electrical appliances – Safety –  
Part 2-41: Particular requirements for pumps

Appareils électrodomestiques et analogues – Sécurité –  
Partie 2-41: Exigences particulières pour les pompes

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**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
SAFETY –****Part 2-41: Particular requirements for pumps**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2002 including its Amendment 1 (2004) and its Amendment 2 (2009). It constitutes a technical revision.

The principal changes in this edition as compared with the third edition of IEC 60335-2-41 are as follows (minor changes are not listed):

- Added a normative reference to IEC 60364-7-702 and updated the title for IEC 60364-7-701.
- Clarified the normal operation for pumps in 3.1.9.
- Added requirements for deep well pumps in 3.105 and 25.8.
- Modified 15.102 to indicate that the tube connecting the inlet to the outlet may go via a tank containing a suitable volume of water so as to avoid overheating the pump.
- Deleted references in the bibliography.

- Deleted or converted to normative the notes from 7.1, 22.101, and 22.106.

The text of this standard is based on the following documents:

FDIS	Report on voting
61/4457/FDIS	61/4511/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for pumps.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

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NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause; [IEC 60335-2-41:2012](http://www.iteh.ai/catalog/standards/sist/587c18f8-d45b-4f38-ad42-6858d88e5423/iec-60335-2-41-2012)
- additional annexes are lettered AA, BB, etc. <http://www.iteh.ai/catalog/standards/sist/587c18f8-d45b-4f38-ad42-6858d88e5423/iec-60335-2-41-2012>

NOTE 3 The following print types are used:

- requirements: in roman type;
- test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

The following differences exist in the countries indicated below.

- 6.1: Pumps intended to be used in or close to swimming pools, garden ponds and similar places may be class 0I if their supply circuit incorporates a residual current device. Other pumps may be class 0I (Japan).
- 6.1: Class 0 aquarium pumps are allowed (USA).
- 6.1: Class II table fountain pumps are not allowed (USA).
- 7.12.1: Stationary pumps not incorporating a protective device are to be marked with the characteristics of the device to be installed in the fixed wiring (USA).
- 15.1.1: The test is different (USA).
- 20.1: This test is only carried out on fountain pumps, the angle being 15° (USA).
- 22.105: The test is different (USA).

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## INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

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This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

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NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.



# HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

## Part 2-41: Particular requirements for pumps

### 1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric pumps for liquids having a temperature not exceeding 90 °C, intended for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

NOTE 101 Examples of appliances within the scope of this standard are

- aquarium pumps;
- pumps for garden ponds;
- **shower-boost pumps**;
- **sludge pumps**;
- **submersible pumps**;
- table fountain pumps;
- **vertical wet pit pumps**.

Appliances not intended for normal household use, but that nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

- persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

NOTE 102 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities.

NOTE 103 This standard does not apply to

- **stationary circulation pumps** for heating and service water installations (IEC 60335-2-51);
- pumps for flammable liquids;
- pumps intended exclusively for industrial purposes;
- pumps intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- pumps incorporating chlorinators of the electrolytic type.

NOTE 104 Pumps incorporated in appliances are not covered by this standard unless a specific reference is made.

## 2 Normative references

This clause of Part 1 is applicable, except as follows.

*Addition:*

IEC 60364-7-701, *Low voltage electrical installations – Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower*

IEC 60364-7-702, *Low voltage electrical installations – Part 7-702: Requirements for special installations or locations – Swimming pools and fountains*

## 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

**3.1.9 Replacement:**

### **normal operation**

operation of the appliance under the following conditions:

Pumps are operated with the inlet in liquid at zero pressure, and the discharge outlet is maintained between the minimum and maximum total head, so that the highest power input is attained. The total head is measured between the inlet and the discharge outlet.

**Sludge pumps** are operated with water.

### **3.101**

#### **submersible pump**

pump having the electrical part completely or partially immersed in liquid during normal use

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Note 1 to entry: The motor windings may be dry, immersed in oil or in the pumped liquid.

### **3.102**

#### **vertical wet pit pump**

pump having the electrical part separated from the hydraulic part and not immersed in liquid during normal use

Note 1 to entry: Controls such as water level switches may be immersed in the liquid.

### **3.103**

#### **sludge pump**

pump intended for moving a mixture of water and small solids

Note 1 to entry: **Sludge pumps** may be **submersible pumps** or **vertical wet pit pumps**.

### **3.104**

#### **shower-boost pump**

pump for installation in the water supply system to increase the water flow for showering purposes

### **3.105**

#### **deep well pump**

multistage submersible pump intended to be used in bore wells

## 4 General requirement

This clause of Part 1 is applicable.

## 5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

### 5.7 Addition:

*The liquid temperature is maintained between 0 °C and –5 °C of the temperature marked on the pump.*

**5.101** Pumps are tested as **portable appliances**, unless they are **fixed appliances**.

**5.102** **Stationary pumps** having a three-phase motor that does not incorporate a **protective device** are installed with an appropriate device, in accordance with the instructions.

## 6 Classification

This clause of Part 1 is applicable except as follows.

### 6.1 Modification:

**Submersible pumps** for use in swimming pools when persons are in the pool shall be **class III** with a **rated voltage** not exceeding 12 V.

Other **submersible pumps** for use in water and other conducting liquids shall be **class I** or **class III**. However, aquarium pumps may be **class II**. Table fountain pumps for indoor use may also be **class II** as long as their **rated power input** does not exceed 25 W.

**Portable pumps** for cleaning and other maintenance of swimming pools shall be **class I** or **class III**.

Other pumps shall be **class I**, **class II** or **class III**.

### 6.2 Addition:

**Submersible pumps** shall be IPX8.

**Portable pumps** for cleaning and other maintenance of swimming pools shall be at least IPX7.

**Shower-boost pumps** intended for installation outside of zones 1 and 2, as specified in IEC 60364-7-701, shall be at least IPX2.

Other pumps shall be at least IPX4.

## 7 Marking and instructions

This clause of Part 1 is applicable except as follows.

### 7.1 Addition:

Pumps having a **rated power input** exceeding 50 W shall be marked with

– the minimum total head, in metres, if greater than zero;

- the maximum operating depth, in metres, with a minimum of 1 m (for **submersible pumps**);
- the direction of rotation (for pumps having three-phase motors).

Pumps shall be marked with the maximum liquid temperature, which shall not be less than 35 °C. If the temperature exceeds 35 °C, pumps shall be marked with the maximum period of operation, unless they are intended for continuous operation.

**7.6 Addition:**

$H_{\min}$  minimum total head

$\frac{\nabla}{\dots m}$  maximum operating depth

**7.12 Addition:**

The instructions for **class I portable pumps** for cleaning and other maintenance of swimming pools shall include the substance of the following:

- the pump must not be used when people are in the water;
- the pump must be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The instructions for pumps marked with a temperature exceeding 35 °C shall state the maximum period of operation and the minimum rest period, unless the pump is intended for continuous operation at this temperature.

The instructions for **submersible pumps** for use in swimming pools shall state the substance of the following:

Disconnect the pump from the supply mains before carrying out user maintenance such as cleaning the filter.

**7.12.1 Addition:**

The installation instructions shall provide information on requirements specified for the electrical installation and shall include reference to national wiring rules. If reference is made to zones, the corresponding drawings shall be included.

The installation instructions shall state the substance of the following:

- the maximum total head, in metres (for pumps having a **rated power input** exceeding 50 W);
- pollution of the liquid could occur due to leakage of lubricants (for **submersible pumps** and **vertical wet pit pumps** containing lubricants);
- a protective device is to be installed in the fixed wiring and its characteristics are to be specified (for **stationary pumps** having a three-phase motor not incorporating a **protective device**).

The installation instructions for pumps intended to be used in outdoor fountains, garden ponds and similar places shall state that the pump is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class I pumps** for swimming pools shall state that the pump is to be supplied by an isolating transformer or supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

The installation instructions for **class III pumps** intended to be installed in zone 0 of a swimming pool, as defined in IEC 60364-7-702, shall state that the transformer is to be located outside zone 1.

The installation instructions for **class II pumps** intended to be fixed in zone 1 of a swimming pool, as defined in IEC 60364-7-702, or fixed close to a garden pond or similar place, shall state that the pump is to be located where flooding cannot occur.

NOTE A sump without an adequate outlet for the liquid is considered to be a place where flooding is likely to occur.

## 8 Protection against access to live parts

This clause of Part 1 is applicable.

## 9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

## 10 Power input and current

This clause of Part 1 is applicable.

## 11 Heating

This clause of Part 1 is applicable except as follows.

### 11.7 Replacement:

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*Pumps are operated with the liquid maintained at the temperature marked on the pump. They are operated until steady conditions are established unless they are marked with a maximum period of operation. In this case, they are operated for the marked period followed by the rest period specified in the instructions, the test being carried out for three cycles of operation. **Shower-boost pumps** that are also supplied with cold water are operated with the cold water at  $15\text{ °C} \pm 2\text{ °C}$ .*

*Pumps, other than **shower-boost pumps**, marked with a maximum period of operation are also operated with the liquid maintained at  $35\text{ °C}$  until steady conditions are established.*

### 11.8 Addition:

*For pumps marked with a liquid temperature exceeding  $35\text{ °C}$ , the temperature rise of the external enclosure is not measured.*

## 12 Void

## 13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

## 14 Transient overvoltages

This clause of Part 1 is applicable.